

LBNE LAr Parameters Spreadsheet

Version 10.6 - 11/4/2011
Changes highlighted in RED

33 kton
Input value
Calculated
Reference Design, 800'

Quality	Meaning
***	Stable, well understood parameter
**	Reasonably well defined parameter
*	Rough estimate

Parameter	Value	Units	Qual ity	Req ID	Notes
Anode Plane Assembly (APA)					
Wire spacing - X plane	4.5	mm	***		Should be <5 mm for good tracking resolution and e-pi0 separation. Doc #266
Wire spacing - U plane	4.888	mm	***		Should be similar to X plane. Exact size chosen to have an integral number of readout cards (multiples of 128)on an APA
Wire spacing - V plane	5.012	mm	***		Should be similar to X plane. Exact size chosen to have an integral number of readout cards (multiples of 128)on an APA
Wire plane gap	4.5	mm	***		Should be ~same as the wire spacing
Wire angle, u	45.707	deg	***		Optimized for beam neutrino interactions. Doc #2836. Angle is with respect to x direction.
Wire angle, v	44.275	deg	***		Optimized for beam neutrino interactions. Doc #2836. Angle is with respect to x direction.
APA length	2.52	m	***		Should be ~2.5m for std truck transport. This active width chosen to have integral number of readout cards.
Num grid wires	1120				Grid wires have same orientation as the X plane
Num U wires	720				Convert formula result to integer
Num V wires	720				Convert formula result to integer
Num X wires	1120				Convert formula result to integer
Wire diameter	150	micron	***		copper-beryllium wire. Standard chamber wire
Wire tension	5.00	N	*		Hardened Cu-Be has 30 N break strength
APA num readout wires	2560				Convert formula result to integer
Num readout channels per APA	3				Divide by MUX level & redundancy factor
APA total num wires	3680				
Drift distance	3.70	m			Should be ~ 2.5 m. Assumes CPA mesh on centerline of CPA tubing.
APA height	7.0	m	***		Chosen for ease of transport and cryostat depth. This is the active height, not the total height
APA thickness	9	cm	***		2" thick x 4" wide SS frame + 3 wire planes on both sides (4 boards with thickness = wire spacing)
APA weight	258	kg	***		Includes frame, printed circuit boards, readout boards, covers
U Wire length	10.02	m			
V Wire length	9.78	m			
Wire capacitance (in air)	15	pF/m	***		H. Jostlein measurement of prototype
U,V wire capacitance (in LAr)	241	pF			Apply dielectric constant for LAr
APA Cell Active Volume	130	m^3			Each cell has one APA in the middle
APA Cell Active Mass	0.18	kton			
APA Transverse Fiducial cut	0.3	m	*		Approx value for neutrino oscillation physics. Basis - MicroBooNE and ArgoNeuT studies
Cathode Plane Assembly (CPA)					
CPA thickness	2.5	cm	***		
Cathode plane weight	100	kg	***		
Detector Module					
Cryostat module					
Electronics					
High Voltage					
Cryogenics					
Detector Depth					
Radioactive Background					
Veto System					
Veto Configuration					
Veto Counter					
Photon Detector					
DAQ					
Cavern & Pit					